Table 1. Summary of hypotheses, corresponding specific predictions, and results.

Hypotheses & Specific Predictions	Supported?	Results
Tree size and microenvironment		
Across the forest vertical profile, taller trees are exposed to higher evaporative demand.		
Taller trees experience higher wind speeds during the peak growing season months.	yes	Fig. 3
Taller trees experience lower humidity during the peak growing season months.	yes	Fig. 3
Taller trees experience higher air temperatures during the peak growing season months.	no	Fig. 3
Taller trees have more sun-exposed crowns.	yes	Fig. 3
At least within the forest setting, taller trees are less drought resistant.		
Rt decreases with height (H).	yes	Fig. 4; Tables S6, S7
Small trees (lower root volume) in drier microhabitats have lower drought resistance.		
There is a negative interactive effect between H and topographic wetness index.	(no)	Tables S6, S7
Species traits		
Species' traits–particularly leaf hydraulic traits–predict drought reistance.		
Wood density correlates (positively or negatively) to Rt.	-	Tables S4, S5
Leaf mass per area correlates positively to Rt.	-	Tables S4, S5
Ring-porous species have higher Rt than diffuse- or semi-ring- porous.	-	Tables S4, S5
Percent loss leaf area upon desiccation correlates negatively with Rt.	yes	Fig. 4; Tables S6, S7
Water potential at turgor loss correlates negatively with Rt.	(yes)	Fig. 4; Tables S6, S7

Parentheses indicate that the prediction was supported by one but not all of the top models (Table S6). Dash symbols indicate that the response was not significant (Table S4), or not represented in any of the top models (Table S6).

Table 2. Overview of analyzed species, listed in order of their relative contributions to woody stem productivity ($ANPP_{stem}$) in the plot, along with numbers and sizes sampled, and species traits. Variable abbreviations are as in Table 3.

			DBH (cm)		species traits (mean +/- sd)				
species	$\% ANPP_{stem}$	n trees	mean	range	WD ($g\,cm^{-3}$)	LMA ($g\,cm^{-2}$)	xylem porosity	π_{tlp} (Mpa)	PLA (%)
Liriodendron tulipifera (LITU)	47.1	98	368.54	100 - 1004	0.4 ± 0.03	46.92 ± 12.38	diffuse	-1.92 ± 0.17	19.56 ± 2.06
Quercus alba (QUAL)	10.7	61	471.51	114 - 791	0.61 ± 0.02	75.8 ± 11.05	ring	-2.58 ± 0.08	8.52 ± 0.37
Quercus rubra (QURU)	10.1	69	548.79	110.7 - 1480	0.62 ± 0.02	71.13 ± 6.70	ring	-2.64 ± 0.28	11.01 ± 0.84
Quercus velutina (QUVE)	7.8	77	541.38	160.2 - 1142	0.65 ± 0.04	48.69 ± 3.30	ring	-2.39 ± 0.15	13.42 ± 0.84
Quercus montana (QUPR)	4.8	59	422.48	105 - 872	0.61 ± 0.01	71.77 ± 40.17	ring	-2.36 ± 0.09	11.75 ± 1.37
Fraxinus americana (FRAM)	3.8	62	353.63	64 - 947.3	0.56 ± 0.01	43.28 ± 4.78	ring	-2.1 ± 0.36	13.06 ± 1.06
Carya glabra (CAGL)	3.7	31	313.89	98 - 985	0.62 ± 0.04	42.76 ± 0.94	ring	-2.13 ± 0.50	21.09 ± 5.48
Juglans nigra (JUNI)	2.1	31	481.42	242 - 870	1.09 ± 0.09	72.13 ± 7.10	semi-ring*	-2.76 ± 0.21	24.64 ± 8.72
Carya cordiformis (CACO)	2.0	13	271.87	107 - 615	0.83 ± 0.10	45.86 ± 15.60	ring	-2.13 ± 0.45	17.22 ± 2.25
Carya tomentosa (CATO)	2.0	13	209.74	121 - 322.1	0.83	45.36	ring	-2.2	16.56
Fagus grandifolia (FAGR)	1.5	80	235.11	112 - 1072	0.62 ± 0.03	30.68 ± 4.94	diffuse	-2.57	9.45 ± 1.25
Carya ovalis (CAOVL)	1.1	23	352.87	149 - 660	0.96 ± 0.33	47.6 ± 3.95	ring	-2.48 ± 0.04	14.8 ± 6.34

* Semi-ring porosity is intermediate between ring and diffuse. We group it with diffuse-porous species for more even division of species between categories.

Table 3. Summary of dependent and independent variables in our statistical models fo drought resistance, along with units, definitions, and sample sizes.

variable	symbol	units	description	category	n*
Dependent variables					
drought resistance	Rt	-	ratio of growth during drought year to mean growth of the 5 years prior.	-	1623
	Rt_{ARIMA}	-	ratio of growth during drought year to growth predicted by ARIMA model.	-	1654
Independent variables					
drought year	Y	-	year of drought	1966	513
				1977	543
				1999	567
height	H	m	estimated H in drought year	-	-
topographic wetness index	TWI	-	steady-state wetness index based on slope and upstream contributing area	-	-
species' traits					
wood density	WD	g cm^{-3}	dry mass of a unit volume of fresh wood	-	-
leaf mass per area	LMA	kg m^{-2}	ratio of leaf dry mass to fresh leaf area	-	-
xylem porosity		-	vessel arrangement in xylem	ring (R)	408
				semi-ring (SR)	31
				diffuse (D)	178
turgor loss point	π_{tlp}	MPa	water potential at which leaves wilt	-	-
percent loss area	PLA_{dry}	%	percent loss of leaf area upon dessication	-	-

*Sample sizes are after removal of outliers, and refer to the Rt model. Dashes indicate that the variable was available for all records.

Figure Legends

Figure 1. Climate and species-level growth responses over our study period, highlighting the three focal drougths (a) and community-wide responses (b). Time series plot (**a**) shows peak growing season (May-August) climate conditions and residual chronologies for each species (see Table 3 for codes). PET and PRE data were obtained from the Climatic Research Unit high-resolution gridded dataset (CRU TS v.4.01; Harris et al. 2014). Focal droughts are indicated by dashed lines, and shading indicates the pre-drought period used in calculations of the resistance metric. Figure modified from Helcoski *et al.* (2019). Density plots (**b**) show the distribution of resistance values for each drought.

Figure 2. Contemporary height profiles in sun exposure and growing season microclimate under non-drought conditions. Shown are average (± SD) of daily maxima and minima of (a) wind speed, (b) relative humidity (RH), and (c) air temperature (T_{air}) averaged over each month of the peak growing season (May-August) from 2016-2018. In these plots, heights are slightly offset for visualization purposes. Also shown is (d) tree heights by 2018 crown position. In all plots, the dashed horizontal line indicates the 95th percentile of tree heigts in the ForestGEO plot.

Figure 3. Drought resistance, Rt, across species for the three focal droughts. Species codes are given in Table 2.

Figure 4. ...

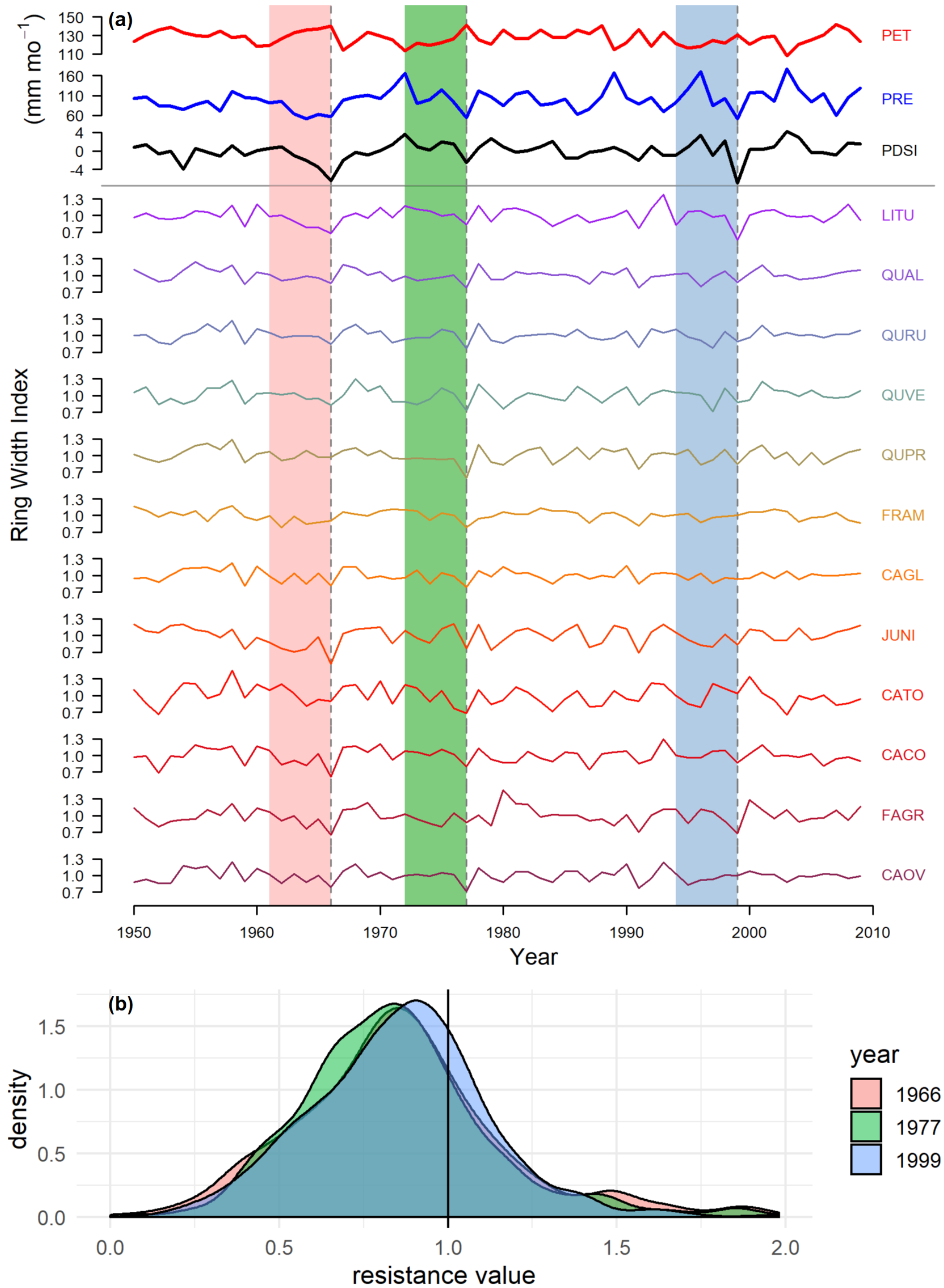
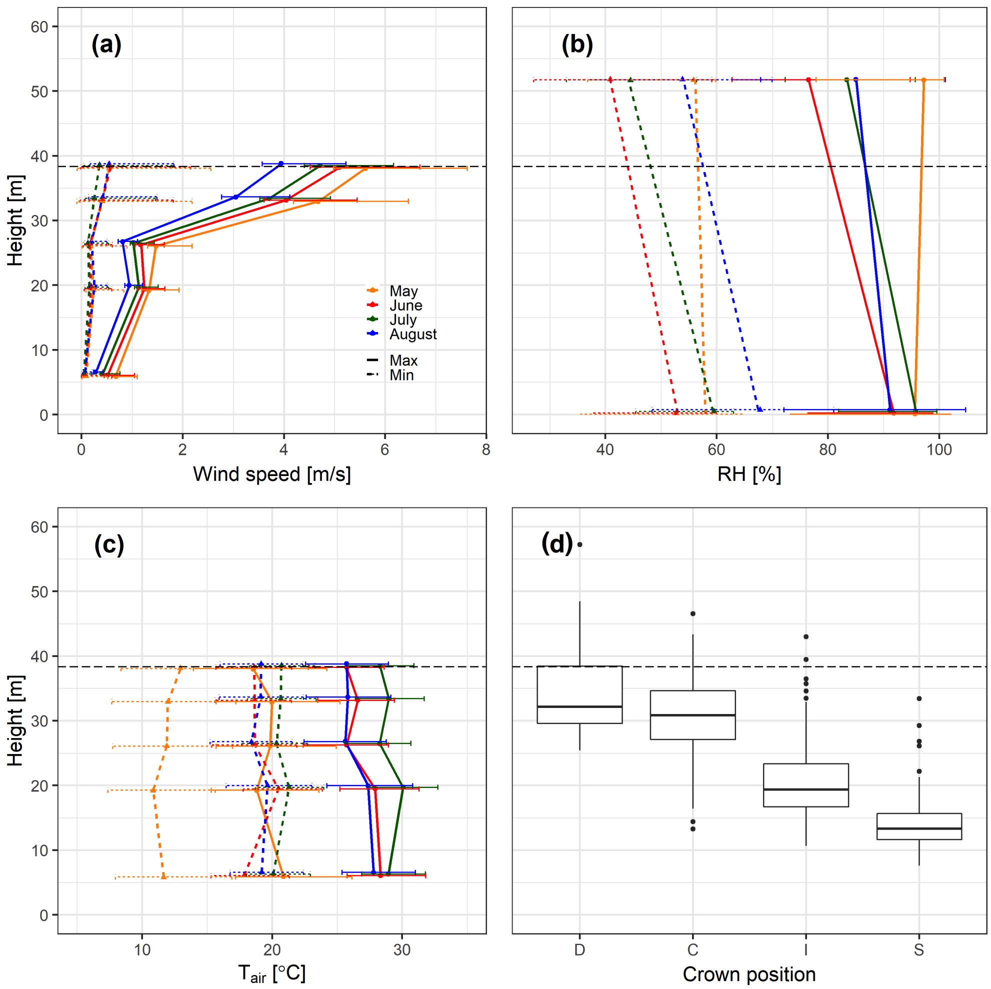


Figure 1. Climate and species-level growth responses over our study period, highlighting the three focal droughts (a) and community-wide responses (b). Time series plot (a) shows peak growing season (May-August) climate conditions and residual chronologies for each species (see Table 3 for codes). PET and PRE data were obtained from the Climatic Research Unit high-resolution gridded dataset (CRU TS v.4.01; Harris et al. 2014). Focal droughts are indicated by dashed lines, and shading indicates the pre-drought period used in calculations of the resistance metric. Figure modified from Helcoski *et al.* (2019). Density plots (b) show the distribution of resistance values for each drought.



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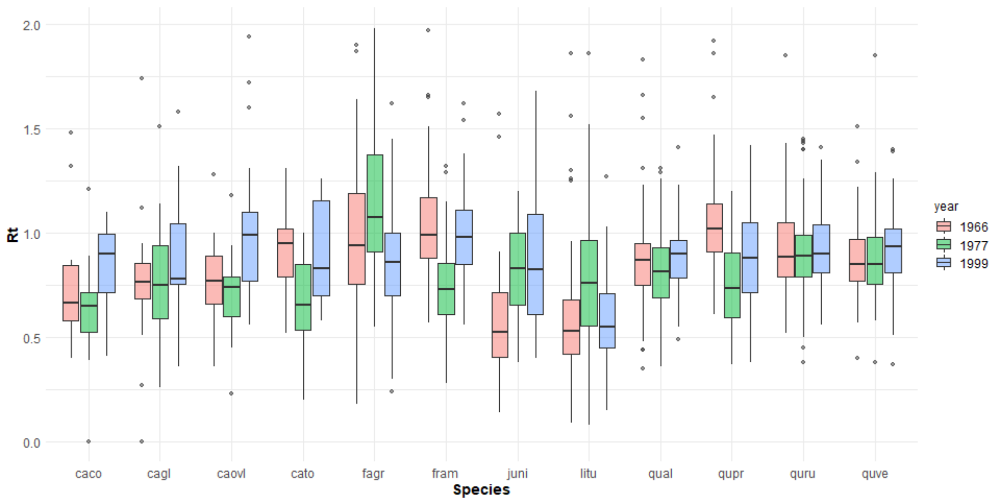

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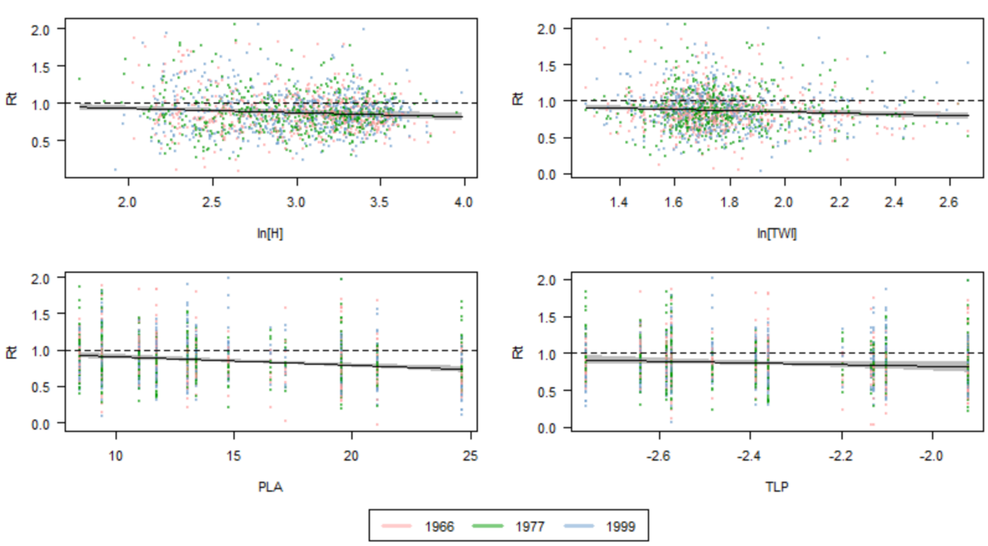

Figure 4_option1. Visualization of best model for all droughts combined. Model coefficients are given in Table S6.**

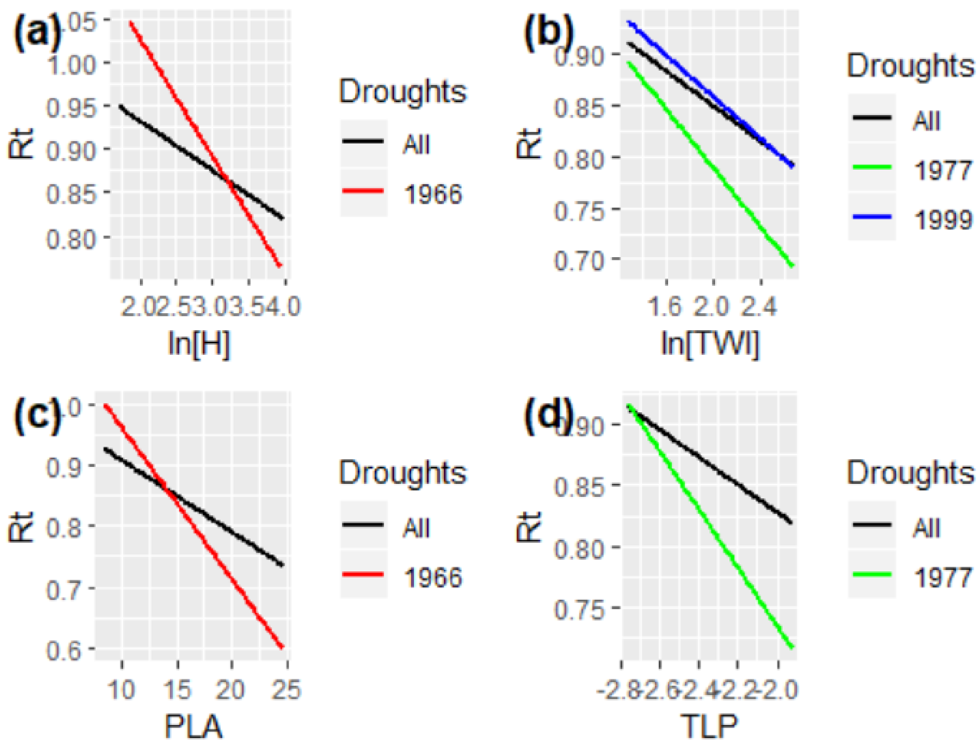

Figure 4_option 2. Visualization of best model for all droughts combined and for each drought separately. Model coefficients are given in Table S6. **confidence intervals would be added.**